The Network Society
A Cross-cultural perspective

Edited by **Manuel Castells**

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ells – one of the world's pre eminent social scientists – has drawn
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nd politics. The contributors demonstrate that the network
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Society is an outstanding and original volume of direct interest
particularly in the fields of social sciences, communication
business schools – as well as for policymakers engaged in
policy and economic development. Business and management
lso discover much of value to them within this book.

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Manuel Castells

NETWORKS, SOCIETY, AND COMMUNICATION TECHNOLOGY

A network society is a society whose social structure is made of networks powered by microelectronics-based information and communication technologies. By social structure, I understand the organizational arrangements of humans in relations of production, consumption, reproduction, experience, and power expressed in meaningful communication coded by culture. A network is a set of interconnected nodes. A node is the point where the curve intersects itself. A network has no center, just nodes. Nodes may be of varying relevance for the network. Nodes increase their importance for the network by absorbing more relevant information, and processing it more efficiently. The relative importance of a node does not stem from its specific features but from its ability to contribute to the network's goals. However, all nodes of a network are necessary for the network's performance. When nodes become redundant or useless, networks tend to reconfigure themselves, deleting some nodes, and adding new ones. Nodes only exist and function as components of networks. The network is the unit, not the node.

"Communication networks are the patterns of contact that are created by flows of messages among communicators through time and space" (Monge and Contractor, 2003: 39). So, networks process flows. Flows are streams of information between nodes circulating through the channels of connection between nodes. A network is defined by the program that assigns the network its goals and its rules of performance. This program is made up of codes that include valuation of performance and criteria for success or failure. To alter the outcomes of the network, a new program (a set of compatible codes) will have to be installed in the network – from outside the network. Networks cooperate or compete with each other. Cooperation is based on the ability to communicate between networks. This ability depends on the existence of codes of translation and inter-operability between the networks (protocols of communication), and on access to connection points (switches). Competition

depends on the ability to outperform other networks by superior efficiency in performance or in cooperation capacity. Competition may also take a destructive form by disrupting the switches of competing networks and/or interfering with their communication protocols.

Networks work on a binary logic: inclusion/exclusion. Within the network, distance between nodes tends to zero, as networks follow the logic of small worlds' properties: they are able to connect to the entire network and communicated networks from any node in the network by sharing protocols of communication. Between nodes in the network and those outside the network distance is infinite, since there is no access unless the program of the network is changed. Thus, networks are self-reconfigurable, complex structures of communication that ensure, at the same time, unity of purpose and flexibility of its execution by the capacity to adapt to the operating environment.

Networks, however, are not specific to twenty-first century societies or, for that matter, to human organization. Networks constitute the fundamental pattern of life, of all kinds of life. As Fritjof Capra writes "the network is a pattern that is common to all life. Wherever we see life, we see networks" (2002: 9). In social life, social networks analysts have for a long time investigated the dynamic of social networks at the heart of social interaction and the production of meaning, leading to the formulation of a systematic theory of communication networks (Monge and Contractor, 2003). Furthermore, in terms of social structure, archaeologists and historians of antiquity have forcefully reminded us that the historical record shows the pervasiveness and relevance of networks as the backbone of societies, thousands of years ago, in the most advanced ancient civilizations in several regions of the planet. Indeed, if we transfer the notion of globalization to the geography of the ancient world, as determined by available transportation technologies, there was globalization of a sort in antiquity, as societies depended for their livelihood, resources, and power on the connectivity of their main activities to networks transcending the limits of their locality (La Bianca, forthcoming).

This observation of the actual historical record runs counter to the predominant vision of the evolution of society that has focused on a different type of organization: hierarchical bureaucracies based on the vertical integration of resources and subjects as the expression of the organized power of a social elite, legitimized by mythology and religion. This is to some extent a distorted vision as historical and social analysis has been built, more often than not, on ethnocentrism and apology rather than on the scholarly investigation of the complexity of a multicultural world. But the relative indifference of our historical representation to the importance of networks in the structure and dynamics of society may also be linked to the actual subordination of these networks to the logic of vertical organizations, whose power was inscribed in the institutions of society and distributed in one-directional flows of information and resources (Colas, 1992).

My hypothesis for the historical superiority of vertical hierarchical organizations over networks is that the networked form of social organization had material limits to overcome, limits that were fundamentally linked to available technology. Indeed, networks have their strength in their flexibility, adaptability, and self-reconfiguring capacity. Yet, beyond a certain threshold of size, complexity, and volume of exchange, they become less efficient than vertically organized command and control structures, *under the conditions of pre-electronic communication technology* (Mokyr, 1990). Yes, wind-powered vessels could build sea-crossing, and even transoceanic, networks of trade and conquest. And horse-riding emissaries or fast-running messengers could maintain communication from the center to the periphery of vast territorial empires. But the time lag of the feedback loop in the communication process was such that the logic of the system amounted to a one-way flow of information and instruction. Under such conditions, networks were an extension of power concentrated at the top of the vertical organizations that shaped the history of humankind: states, religious apparatuses, war lords, armies, bureaucracies, and their subordinates in charge of production, trade, and culture.

The ability of networks to introduce new actors and new contents in the process of social organization, with relative independence of the power centers, increased over time with technological change, and, more precisely, with the evolution of communication technologies. This was particularly the case with the possibility of relying on a distributed energy network that characterized the advent of the industrial revolution: railways, ocean liners, and the telegraph constituted the first infrastructure for a quasi-global network with self-reconfiguring capacity. However, industrial society (both in its capitalist and its statist versions) was predominantly structured around large-scale, vertical production organizations and extremely hierarchical state apparatuses, in some instances evolving into totalitarian systems. This is to say that early, electrically based communication technologies were not powerful enough to equip networks with autonomy in all their nodes, as this autonomy would have required multidirectionality and a continuous flow of interactive information processing. But it also means that the availability of proper technology is a necessary, but not sufficient condition for the transformation of the social structure. It was only under the conditions of a mature industrial society that autonomous projects of organizational networking could emerge. When they did, they could use the potential of microelectronics-based communication technologies.

Networks became the most efficient organizational form as a result of three major features of networks that benefited from the new technological environment: flexibility, scalability, and survivability.

- *Flexibility*: networks can reconfigure according to changing environments, keeping their goals while changing their components. They go around blocking points in communication channels to find new connections.
- *Scalability*: they can expand or shrink in size with little disruption.
- *Survivability*: because they have no center, and can operate in a wide range of configurations, networks can resist attacks on their nodes and codes because the codes of the network are contained in multiple nodes that can reproduce the instructions and find new ways to perform. So, only the physical ability to destroy the connecting points can eliminate the network.

At the core of the technological change that unleashed the power of networks was the transformation of information and communication technologies, based on the microelectronics revolution that took place in the 1940s and 1950s. It constituted the foundation of a new technological paradigm, consolidated in the 1970s, mainly in the United States, and rapidly diffused throughout the world, ushering in what I have characterized, descriptively, as the information age.

William Mitchell, in an important and well-documented book (Mitchell, 2003), has retraced the evolving logic of information and communication technology throughout history as a process of expansion and augmentation of the human body and the human mind; a process that, in the early twenty-first century, is characterized by the explosion of portable machines that provide ubiquitous wireless communication and computing capacity. This enables social units (individuals or organizations) to interact anywhere, anytime, while relying on a support infrastructure that manages material resources in a distributed information power grid. With the advent of nanotechnology and the convergence between microelectronics and biological processes and materials, the boundaries between human life and machine life are blurred, so that networks extend their interaction from our inner self to the whole realm of human activity, transcending barriers of time and space. Neither Mitchell nor I indulge in science fiction scenarios as a substitute for analysis of the techno-social transformation process. But it is essential, precisely for the sake of analysis, to emphasize the role of technology in the process of social transformation, particularly when we consider the central technology of our time, communication technology, which relates to the heart of the specificity of the human species: conscious, meaningful communication (Capra, 1996, 2002).

It is because of available electronic information and communication technologies that the network society can deploy itself fully, transcending the historical limits of networks as forms of social organization and interaction. This approach is different from the conceptual framework that defines our societies as information or knowledge societies. To be blunt, I believe that this is an empirical and theoretical error, as I will elaborate in the conclusion to this chapter. But let me advance the argument.

The reason, very simply, is that, as far as we can trust the historical record, all known societies are based on information and knowledge as the source of power, wealth, and meaning (Mokyr, 1990; Mazlish, 1993). Information has not much value per se without the knowledge to recombine it for a purpose. And knowledge is, of course, relative to each culture and society. So, knowledge of metallurgy or the technology of sailing or Roman law were the essential means of information and knowledge on which military power, administrative efficiency, the control of resources, and, ultimately, wealth and the rules for its distribution were based. So, if information and knowledge are the key factors for power and wealth in *all* societies, it is misleading to conceptualize our society as such, even if, for the practical reason of making communication easier, I gave in to the fashion of the times in my labels by characterizing our historical period as the "information age." What we actually mean, and what I always meant, is that our society is characterized by the power embedded in information technology, at the heart of an entirely new technological paradigm, which I called informationalism. Yet printing is also a most important information technology, and it has been around for quite a while, particularly in China. And we do not usually consider the post-printing societies as information societies.

So, what is actually new, both technologically and socially, is a society built around microelectronics-based information technologies. To which I add biological technologies based on genetic engineering, as they also refer to the decoding and recoding of the information of living matter. Furthermore, information technologies can be more properly labeled as communication technologies, since information that is not communicated ceases to be relevant. The early emphasis on information technology, semantically separated from communication, reflected, in fact, the logic of stand-alone electronic devices and computers. This is outdated, at least since the deployment of the Arpanet, more than three decades ago. It is also a reflection of the division of the world of communication technology between computers, telecommunications, and the broadcast media. Again, this is a distinction that has a relative justification in the business and institutions that organize each domain, but is senseless in technological terms. Thus, what is specific to our world is the extension and augmentation of the body and mind of human subjects in networks of interaction powered by microelectronics-based, software-operated, communication technologies. These technologies are increasingly diffused throughout the entire realm of human activity by growing miniaturization. They are converging with new genetic engineering technologies able to reprogram the communication networks of living matter. It is on this basis that a new social structure is expanding as the foundation of our society: the network society.

INFORMATIONALISM: THE TECHNOLOGICAL PARADIGM OF THE NETWORK SOCIETY

Technology, understood as material culture, is a fundamental dimension of social structure and social change (Fischer, 1992: 1–32). Technology is usually defined as the use of scientific knowledge to set procedures for performance in a reproducible manner. It evolves in interaction with other dimensions of society, but it has its own dynamics, linked to the conditions of scientific discovery, technological innovation, and application and diffusion in society at large. Technological systems evolve incrementally, but this evolution is punctuated by major discontinuities, as Stephen J. Gould (1980) has convincingly argued for the history of life. These discontinuities are marked by technological revolutions that usher in a new technological paradigm. The notion of paradigm was proposed by Thomas Kuhn (1962) to explain the transformation of knowledge by scientific revolutions, and imported into the social and economic formations of technology by Christopher Freeman (1982) and Carlota Perez (1983). A paradigm is a conceptual pattern that sets the standards for performance. It integrates discoveries into a coherent system of relationships characterized by its synergy; that is, by the added value of the system vis-à-vis its individual components. A technological paradigm organizes a series of technological discoveries around a nucleus and a system of relationships that enhance the performance of each specific technology.

Informationalism is the technological paradigm that constitutes the material basis of early twenty-first century societies. Over the last quarter of the twentieth century of the Common Era it replaced and subsumed industrialism as the dominant technological paradigm. Industrialism, associated with the industrial revolution, is a paradigm characterized by the systemic organization of technologies based on the capacity to generate and distribute energy by human-made machines without depending on the natural environment – albeit they use natural resources as an input for the generation of energy. Energy is a primary resource for all activities, and by transforming energy generation, and the ability to distribute it to any location and to portable applications, humankind became able to increase its power over nature, taking charge of the conditions for its own existence (not necessarily a good thing, as the historical record of the twentieth-century shows). Around the energy nucleus of the industrial revolution, technologies clustered and converged in various fields, from chemical engineering and metallurgy to transportation, telecommunications, and, ultimately, life sciences and their applications.

A similar structuration of scientific knowledge and technological innovation is taking place under the new paradigm of informationalism. To be sure, industrialism does not disappear. It is subsumed by informationalism. Informationalism presupposes industrialism, as energy, and its associated technologies are still a fundamental component of all processes. Informationalism is a technological paradigm based on the augmentation of the human capacity of information processing and communication made possible by the revolutions in microelectronics, software, and genetic engineering. Computers and digital communications are the most direct expressions of this revolution. Indeed, microelectronics, software, computation, telecommunications, and digital communication as a whole, are all components of the same integrated system. Thus, in strict terms, the paradigm should be called "electronic informational-communicationalism." Reasons of clarity and economy suggest, however, that it is better to keep the concept of informationalism, as it is already widely employed and resonates in close parallel to industrialism. As information and communication are the most fundamental dimensions of human activity and organization, a revolutionary change in the material conditions of their performance affects the entire realm of human activity.

However, what is specific to this new system of information and communication technologies that sets it apart from historical experience? I propose that what makes this paradigm unique in relation to previous historical developments of information and communication technologies (such as printing, the telegraph, or the non-digital telephone) are, in essence, three major, distinctive features of the technologies at the heart of the system:

- their self-expanding processing and communicating capacity in terms of volume, complexity, and speed;
- their ability to recombine on the basis of digitization and recurrent communication;
- their distributing flexibility through interactive, digitized networking.

Let me elaborate on these features. I will do it separately for the two fundamental, and originally distinct, fields – digital electronics and genetic engineering – before considering their interaction.

Digital electronics technologies allow for an historically unprecedented increase in the capacity to process information, not only in the volume of information, but in the complexity of the operations involved, and in the speed of processing, including the speed of communication. However, how much is "much more" compared with previous information-processing technologies? How do we know that there is a revolution characterized by a giant leap forward in processing capacity?

One factor in the answer to this fundamental question is empirical. The history of electronics information and communication technologies in the past three decades shows an exponential increase in processing power, coupled with an equally dramatic decrease in the cost per operation, precisely the mark

of a technological revolution, as documented by Paul David (1975) for the industrial revolution. Whatever measures we take in terms of integration of circuitry in microelectronics, of speed and volume in telecommunications, in computing power measured from megabytes to terabytes, and in the management of complex operations per lines of software code, they all show an unprecedented rate of technological change in the information and communication field.

But I advance the hypothesis that there is something else, not only quantitative but qualitative: the capacity of these technologies to self-expand their processing power because of their recurrent, communicative ability. This is because of the continuous feedback effect on technological innovation produced by the knowledge generated with the help of these technologies. In other words, these technologies hold emergent properties; that is, the ability to derive new, unforeseen processes of innovation by their endless reconfiguration (Johnson, 2001). This is a risky hypothesis because processing power may find the physical limits to the further integration of microchips, and the complexity of networked computation may overwhelm the programming power of software developers under the conditions of proprietary software. However, every doomsday prediction of the limits of integration has been belied by manufacturing research. Continuing research into biological materials, and other new materials, may yield new possibilities, including chemically processed DNA-chips. Open source software is overcoming the barriers of technological oligopoly and unleashing waves of new applications and development breakthroughs, in an increasing virtuous circle created by thousands of free programmers networked around the world. And, most significantly, the networking capacity of distributed processing power and software development escapes the limits of stand-alone machines, and creates a global, digitized system of human–machine interaction, always ready for action.

Thus, a formal version of the hypothesis presented above is the following: in the first three decades of the information and communication technology revolution we have observed the self-generated, expansive capacity of new technologies to process information; current limits of integration, programming, and networking capacity are likely to be superseded by new waves of innovation in the making; and if and when the limits of the processing power of these technologies are reached, a new technological paradigm will emerge – under forms and with technologies that we cannot imagine today, except in science fiction scenarios, or in the innovative dreams of the usual suspects.

Secondly, digital technologies are also characterized by their ability to recombine information on the basis of recurrent, interactive communication. This is what I call the hypertext, in the tradition of Ted Nelson and Tim Berners-Lee. One of the key contributions of the Internet is its potential ability to link up everything digital from everywhere and to recombine it. Indeed, the original design of the World Wide Web by Berners-Lee had two functions: a browser and an editor (Berners-Lee, 1999). The commercial and bureaucratic practice of the World Wide Web has largely reduced its use, for most people, to a browser and information provider, connected to an e-mail system. Yet, from shared art creation to the political agora of the anti-globalization movement, and to joint engineering of networked corporate labs, the Internet is quickly becoming a medium of interactive communication beyond the cute, but scarcely relevant practice of chat rooms (increasingly made obsolete by SMSs and other wireless, instant communication systems). The added value of the Internet over other communication media is its capacity to recombine in chosen time information products and information processes to generate a new output, which is immediately processed in the Net, in an endless process of production of information, communication, and feedback in real time or chosen time (Castells, 2001). This is crucial because recombination is the source of innovation, and innovation is at the root of economic productivity, cultural creativity, and political power-making. Indeed, while the generation of new knowledge always required the application of theory to recombined information, the ability to experiment in real time with the results of the recombination, coming from a multiplicity of sources, considerably extends the realm of knowledge generation. It also allows increasing connections between different fields of knowledge and their applications – precisely the source of knowledge innovation in Kuhn's theory of scientific revolutions.

The third feature of new information and communication technologies is their flexibility, which allows the distribution of processing power in various contexts and applications, such as business firms, military units, the media, public services (such as health or distance education), political activity, and personal interaction. Software developments, such as Java and Jini languages, powered the distributive networks. And wireless communications made the multiplication of points of communication possible almost at the level of each individual – except, of course, for the majority of the population of the planet on the other side of the digital divide, a major social issue to which I will return in my analysis of the network society. So, it is not only a matter of the density of the communication network, but also of its flexibility, and of its ability to be integrated in all the sites and contexts of the human environment. As Mitchell (2003: 144) writes "wireless connections and portable access devices create continuous fields of presence that may extend throughout buildings, outdoors, and into public space as well as private. This has profound implications for the locations and spatial distributions of all human activities that depend, in some way, upon access to information." It is this spatial transformation that I have tried to capture under the concept of the space of flows, which interacts with the traditional space of places, so that the new spatial structure associated with informationalism, is not placeless, but is made up of

networks connecting places by information and communication flows, as I will elaborate below.

Under the informational paradigm, the capacity for any communicating subject to act on the communication network gives people and organizations the possibility of reconfiguring the network according to their needs, desires, and projects. Yet (and this is fundamental) the reconfiguring capacity for each subject depends on the pattern of power present in the configuration of the network.

I will elaborate more succinctly on the second component of the information and communication technology revolution: *genetic engineering*. I consider its potential consequences as more far reaching than those already induced by the digital revolution in the structure and dynamics of society. This is because it affects the programs of life, and therefore the basis of our existence. However, its effects have been less diffused throughout the entire social structure because of the nature of its implications which have led to institutional resistance to their application; and also because its true breakthroughs required further advancements in the digital revolution, whose technologies are essential for the qualitative development of biological research (as was shown by the decisive role played by massive, parallel computing in the elaboration of the Human Genome Project).

While genetic engineering is often considered as an independent process from the information technology revolution, it is not. First, from an analytical perspective, these technologies are obviously information technologies, focused on the decoding and actual reprogramming of DNA, the code of living matter. And since biologists know that cells do not work in isolation, the real issue is to understand their networks of communication. Thus, genetic engineering is both an information and a communication technology, very much as digital electronics.

Secondly, there is a direct, methodological connection between the two revolutions. Computer models, and computing power, are the tools of trade in genetic engineering nowadays, so that microbiologists, bio-engineers, electrical engineers, chemical engineers, and computer scientists are all essential components of the daring teams attempting to unearth the secrets of life – and in some cases to play God. On the other hand, bio-chips and DNA-based chemically operated computing processes are the foundations of a new form of digital processing and molecular electronics, leading the way to the diffusion of nanotechnology, and, eventually, to the spread of nanobots, in a whole range of applications, including the repair and maintenance of the human body.

Thirdly, there is a theoretical convergence between the two technological fields around the analytical paradigm based on networking, complexity, self-organization, and emergent properties, as illustrated some time ago by the work of visionary teams of researchers at the Santa Fe Institute and as theorized by Fritjof Capra.

Genetic engineering technologies are also characterized by their self-expanding processing capacity, by their ability to recombine through communication networks, and by the flexibility of their distributive power. To be more specific, the existence of the Human Genome Map, and, increasingly, of genetic maps of specific parts of our body, as well as of a number of species and subspecies, raises the possibility of cumulative knowledge in the field of genetic engineering, leading to the understanding of processes that were beyond the realm of observation. In other words, better targeted, new, meaningful experiments become possible as knowledge progresses and fills the empty spaces of the model.

Secondly, the recombining ability of genetic engineering technologies is critical, as it is in the uses of digital communication and information processing. The first generation of genetic engineering applications largely failed because cells were manipulated as isolated entities, without a full understanding of their context, and of their place in the networks of life. Research has shown that cells are defined in their function by their relationship to others. Their DNA structure is meaningless outside the context of their specific interactions. So, interacting networks of cells, communicating through their codes, rather than isolated sets of instructions, are the object of genetic recombination strategies. Emergent properties are associated with networks of genes, and are identified by simulation models, only later validated by clinical experiments.

Finally, the promise of genetic engineering is precisely its ability to reprogram different codes and their protocols of communication in different areas of different bodies (or systems) of different species. Transgenic research and self-regenerative processes in living organisms are the frontiers of genetic engineering. Genetic drugs, which will at some time be delivered by nanotechnology-produced devices, are intended to induce in the body the capability of self-programming by living organisms: this is the ultimate expression of distributed information-processing power by communication networks.

It was on the foundations of informationalism that the network society gradually emerged as a new form of social organization of human activity in the last lap of the twentieth century. Without the capacity provided by this new technological paradigm, the network society would not be able to operate, just as industrial society could not fully expand without the use of electricity. But the network society was not the consequence of the technological revolution. Rather, it was the serendipitous coincidence, in a particular time and space, of economic, social, political, and cultural factors that led to the emergence of new forms of social organization which, when they had the historical chance of harnessing the power of informationalism, prevailed and expanded. So, I now turn, succinctly, to the genesis of the network society.

THE RISE OF THE NETWORK SOCIETY

Every new social structure has its own genesis, dependent on spatiotemporal contexts. Naturally, there is a relationship between the historical process of production of a given social structure and its characteristics. However, it is possible to analyze this social structure as a given, without considering in detail the processes that led to its formation. In fact, this is the option taken in this chapter, which is focused on the theory of the network society rather than on its history. Nonetheless, I will summarize some of the analysis of the genesis of the network society, presented in my earlier writings (Castells, 2000b, c), with one specific purpose: to dispel the notion that either technology or social evolution led inevitably to the network society, as the later incarnation of modernity, in the form of postmodernity, or as the information/knowledge society as a natural outcome in the long evolution of the human species. We have ample evidence that there is no predetermined sense of history, and that every age and every power claims ethnocentrically and historocentrically its right to be the supreme stage of human evolution. What we observe throughout history is that different forms of society come and go by accident, internal self-destruction, serendipitous creation, or, more often, as the outcome of largely undetermined social struggles.

True, there has been a long-term trend toward technological development that has increased the mental power of humankind over its environment. But the jury is still out on the outcome of such a process measured in terms of progress, unless we consider as minor issues the highly rational process of mass murder that led to the Holocaust, the management of large-scale incarceration that created gulags out of the hopes for workers' liberation, the nuclear destruction of Hiroshima and Nagasaki to finish off an already vanquished nation, or the spread of AIDS in Africa while pharmaceutical companies and their parent governments discuss payment for their intellectual property rights.

And, to remain in the realm of analysis, nothing predetermined the trajectory taken by the information and communication technology revolution. Personal computers were not in the mind of governments and corporations at the onset of the revolution: it was done by people. And the crucial technology of the network society, the Internet, would have never come to be a global network of free communication if ATT had accepted in 1970 the offer of the American Defense Department to give it free to that corporation; or if Vint Cerf and Robert Kahn had not diffused over the Net the source code of the IP/TCP protocols on which the Internet is still based. Historical evolution is an open-ended, conflictive process, enacted by subjects and actors who try to make society according to their interests and values, or, more often, produce social forms of organization by resisting the domination of those who identify social life with their own desires enforced through violence.

So, how did the network society come about? At its source there was the *accidental coincidence, in the 1970s, of three independent processes*, whose interaction constituted a new technological paradigm, informationalism, and a new social structure, the network society, which are inseparably intertwined. Those three processes were: the crisis and restructuring of industrialism and its two associated modes of production, capitalism and statism; the freedom-oriented, cultural social movements of the late 1960s and early 1970s; and the revolution in information and communication technologies, as described above. Given the analytical purpose of this chapter, I will not enter into the detail of the analysis of these three complex historical processes, but take the liberty of referring the reader to my earlier writings (Castells, 1980, 2000b, c, 2001, 2004; Castells and Kiselyova, 2003). Yet, I will summarize the essence of the analysis as it relates to understanding the formation of the network society.

First, the industrial model of development hit the buffers of its limits to increase productivity growth as the organizations, values, and policies of the industrial society could not manage the transition to knowledge-based productivity growth by using the potential unleashed by information and communication technologies. However, a crisis in the mode of development is translated specifically into a crisis in the model of accumulation that is dominant in each time and space. In the case of capitalism, this meant the calling into question of the Keynesian model that had characterized the period of high productivity increase and steady economic growth after World War II. That model was based on the ability to increase both profits and social redistribution through government guidance and funding, largely in a controlled, domestic policy environment. Productivity growth and market expansion were based on a social contract that ensured social stability, improved living conditions, and mass consumption of mass-produced goods and services. Declining productivity resulted in declining surplus, thus in declining profits, and declining private investment. The model was sustained by increasing public spending and private indebtedness. Public borrowing and increased money supply led to rampant inflation. Under conditions of fiscal stress and inflationary pressures, the sudden rise in oil prices of 1973–5 by OPEC and its associated multinational corporations both increased inflation and provided the opportunity to declare a crisis, and the ensuing search for corrective policies. The worldwide crisis of the 1970s prompted a debate, in the United States as in the rest of the world, on the future of capitalism. Corporations responded by shedding labor, putting pressure on wages, benefits, and job security, globalizing production and markets, stepping up research and development, investing in technology, and finding more flexible, efficient forms of management.

But the decisive shift to a different model of accumulation came from governments, albeit in harmony with corporations. It can be related to the twin

victories of Thatcher in the UK in 1979 and Reagan in the USA in 1980. They were both political conservatives. They came to government with a mission: to recapitalize capitalism, thus ushering in the era of economic liberal policies that by successive waves took over the world, in different political ideological versions, over the next two decades. The crushing of organized labor politically, the cutting of taxes for the rich and the corporations, and widespread deregulation and liberalization of markets, both nationally and internationally, were crucial strategic initiatives that reversed the Keynesian policies that had dominated capitalism in the previous twenty-five years.

Balancing the budget and reducing government intervention was part of the ideology but not of the practice. Indeed, Reagan presided over the largest increase in budget deficit in peace time because of the combination of tax cuts and large military expenditures. He practiced what we called at that time "military Keynesianism," although the term is provocative but incorrect because Keynesianism was not just about inducing outlets, but about integrating people into the consumption process (Carnoy and Castells, 1984). What was important was that, directly through deregulation and privatization policies, and indirectly by the signals sent from government to companies, the rules of the game changed, first in the US, second in the UK, and then in the rest of the world. Market liberalization and the disengagement of government from social spending and income redistribution became a generalized practice, either by ideological choice or by the need to adapt to the rules of the world market, which was imposed by the most powerful players, followed by global flows of investment, and enforced when necessary by the IMF. A new orthodoxy was established throughout the world. We call this process globalization. It is, to be sure, unfettered capitalist globalization, spearheaded by the liberalization of financial markets (the Big Bang of the City of London in October 1987), and enshrined in asymmetrical trade globalization represented by the new managing authority, the World Trade Organization. Under the new conditions, global capitalism recovered its dynamism, and increased profits, investment, and economic growth, at least in its core countries and in the networks that connected areas of prosperity around the world, in the midst of a sea of poverty and marginalization.

I want to emphasize that this was not an historical necessity, nor the only policy that could have restructured capitalism, and ensured its dynamic transition from industrial capitalism to informational capitalism. Indeed, in my book on the economic crisis in America (Castells, 1980), I stressed the coherence of the strategy proposed by Reagan, but I also analyzed the possibilities offered by other political programs in America, for instance the platform represented by Senator Edward Kennedy, a potential president until the Chappaquidik affair, based on a rekindling of government-led policy adapted to the new economic and social conditions. In fact, if one of the key elements of the underlying structural crisis in Western capitalism was the necessity to adapt to a knowledge-based economy, it seemed logical that a strategy of deepening and reforming the welfare state, to provide the human capital necessary for this economy, in terms of education, health, and modernization of the public sector, would have been a better bet in the long term.

Yet, the urgency of restoring profitability to business, and the outcome of the political process, led to the victory of Reaganomics, in Europe to Thatcherism, and in developing countries to the model elaborated by the Chicago boys, disciples of Milton Friedman, which was imposed by dictatorships and the IMF's budgetary discipline. In other words, the crisis of industrialism was also the crisis of the specific model of capitalist accumulation of the mature stage of industrialism, and it was this latter crisis that was addressed as a priority according to the interests and values of the political actors that seized power in the main economies. The political muscle of the US in the global economy, and ideological hegemony, linked to the bankruptcy of statism and to the short-sighted pragmatism of social democracy, did the rest.

This is to say that the institutional conditions for globalization and business flexibility were concomitant with a weakening of the power of labor and a retrenchment of the welfare state. However, they were not the necessary outcome of the crisis of industrialism and of Keynesian capitalism, but one of the options to restructure the system. It just happened to be the winning option. Its victory, on a global scale, created the conditions for the structural transformations that induced not only a new model of capitalism, but also contributed to the emergency of a new social structure.

The shape of this transformation was also influenced by the collapse of statism, as a result of the failure of the restructuring policies that had tried to address its economic and technological crisis. Indeed, precisely in the 1970s, the Soviet economy reached the point of quasi-stagnation, reversing decades of fast economic growth, and its technological development lost pace in relation to the West, particularly in the critical area of information and communication technologies. Our study on the matter (Castells and Kiselyova, 2003) has documented the direct relationship between the features of Soviet statism, based on the control of information and of the capture of technology in the military complex, and the economic and technological crisis of the Soviet Union. Both crises decisively undermined Soviet military power, and prompted the need for reform, opening the way to Gorbachev's *perestroika*. The depth of the crisis was such that Gorbachev had to go outside the channels of the party to call for support for his *perestroika* from civil society. The ensuing process spiraled out of control and led to the unexpected demise of the Soviet empire, in one of the most extraordinary courses of events in history.

Without the backbone provided by the Soviet Union, most statist countries in the Third World gravitated toward Western influence and accepted the

formal and informal leadership of the IMF and its liberal economic policies, opening the way for the rapid spread of capitalist globalization. Chinese Communists undertook their own reform in the hope of keeping state power while joining global capitalism. The experiment is still underway, but, whatever its outcome, it has sharply departed from the logic of statism, and has substantially expanded the space of global capitalism. In the early twenty-first century, while global capitalism is far from being a stable system, it has become the only game on the planet, albeit increasingly challenged by activist minorities, and burdened with the marginalization of the majority of humankind.

There was a second social trend, quite independent from the crises of industrialism, Keynesian capitalism, and Soviet statism: the alternative projects and values emerging from the *cultural social movements of the 1960s and 1970s*. These movements (whose first symbolic manifestations can be traced back to the free speech movement in Berkeley in 1964 and to the May movement in Paris in 1968) were, fundamentally, freedom-oriented. They were the affirmation of a culture of personal freedom and social autonomy, both vis-à-vis capitalism and statism, challenging the conservative establishment as well as the traditional left. They were profoundly political in their implications, but they were not oriented toward the state or preoccupied with the seizing of state power. They did have various formats and ideologies, in interaction with the societies in which they took place: they connected with the civil rights movement in the United States; they called upon the working class and reignited the old tradition of the street barricade in France; they became "imagined proletarians" in Italy (mainly under the mantra of a Maoist ideology that would have prompted Mao to shoot them); they opposed dictatorships in Spain, Portugal, Greece, and throughout Latin America; and they combined with the critique of the industrial work ethic and with the conservatism of society in Germany, The Netherlands, and Japan.

In all cases they opposed war, at the time symbolized by the Vietnam War, but their influence was mainly felt in the assertion of the principle of the autonomy of the individual, in direct challenge to the cultural foundations of societies, starting with the family, the church, the state, and the corporate world. They, of course, failed politically because accessing government was never their goal. Most of their young militants became corporate managers, respected politicians, publishers, academics, new philosophers, consultants, and web designers. Yet, their ideas permeated the entire society of the developed, capitalist world, and reached to the cultural elites of most of the world.

Perhaps the most significant outcome of the 1960s' movements was their productive dissolution into the forms of the more articulate movements that emerged from their demise in the 1970s. Such was the case of feminism. Of course, women's struggles have a long history, way before the Commune of Paris, the American suffragists, the Glasgow general strike of 1915, or the followers of Alexandra Kollontai. They go back to the origins of humankind, and they left their mark in the unofficial history of resistance to patriarchal oppression, as in the many women tortured and burned as witches. But the women's movement, which has spread throughout most of the world since the 1970s, amounting to a mass insurrection of women against their submissive condition, actually succeeded in a real revolution: changing the minds of women about themselves and about their role in family and in society. The movement originated, by and large, in the reaction of militant women in the 1960s' movements against the sexism they experienced from their male comrades, and led to the formation of autonomous feminist movements in the 1970s, and then to pervasive feminist interventions in all realms of society thereafter.

A similar story can be told about the environmental movement: the first Earth Day mobilization in the United States was in May 1970, as an outcome of the debates that had taken place in the social movements of the 1960s after the exhaustion of their explicit political agenda, and their degeneration into a variety of political sects. To save the earth – and my neighborhood in the process – seemed like a good idea, appealing to everybody and connecting with the vitalist, anti-consumption ethics that characterized the young idealists who were participants in the movement. It turned out to be far more subversive of the values and interests of industrialism than the obsolete ideologies of the left. It went on – in the US, in Canada, in Germany, in the UK, in Northern and Western Europe, and, later on, in most of the world – to take on the self-destructive logic of global capitalist development. It eventually connected with the critique of poverty and exploitative economic growth in the world at large, laying the ground for what would become, two decades later, the anti-globalization movement.

For the analytical purpose of this chapter, what must be remembered is that *these social movements were cultural; that is, oriented toward a transformation of the values of society*. And the key values that were put forward, and that ultimately created a new culture around the world, were three: the value of freedom and individual autonomy vis-à-vis the institutions of society and the power of corporations; the value of cultural diversity and the affirmation of the rights of minorities, ultimately expressed in terms of human rights; and the value of ecological solidarity; that is, the reunification of the interest of the human species as a common good, in opposition to the industrial values of material growth and consumption at all costs.

From the combination of these cultural threads arose the challenge to patriarchalism, the challenge to productivism, the challenge to cultural uniformity, and, ultimately, the challenge to state power and to militarism, as expressed in the peace movement.

Thus, while the movements of the 1960s, and the diverse cultural-political expressions that they induced in the 1970s, took place in the ideological and political vacuum related to the crisis of industrialism and of Keynesian capitalism, they were not a response to the crisis, nor were they the harbingers of the new policies and strategies that eventually restarted the engines of capitalism in its new incarnation. However, the values, ideas, and projects that they invented or rediscovered were essential materials in the reconstitution of society, as I will argue below.

There was a third component of the process of multidimensional transformation that took place in the 1970s. This was the *revolution in information and communication technologies* that led to the constitution of informationalism as a new technological paradigm, as presented earlier in this chapter. I will add three comments concerning the relationship between this technological revolution and the processes of capitalist restructuring and cultural social movements that, together, constituted the crucible from which the network society originated.

The first refers to the independence of the origins of this technological revolution from both the other two processes. The invention of the microprocessor, the personal computer, the digital switch, the Internet, and recombinant DNA were not a response to business demands or the needs of capitalism. Military funding and sponsorship was essential, as technological superiority was seen, appropriately, as the means to win the Cold War without actual fighting between the superpowers. But even this dependence on the military was generic to the whole process of technological innovation, not specific to some of the critical technologies that were developed. Miniaturization and advanced telecommunications were essential for missile-based warfare, and they were deliberately targeted by companies under defense contracts. But computer networking, and therefore the Internet, was a byproduct of experimentation by computer scientists for their own scientific curiosity, as the Internet did not have military applications until everybody began to use it in the 1990s. The personal computer was a serendipitous invention of the computer counter-culture, and the best software development was based on open source, and so was produced outside the corporate world, in the universities and in freelance ventures.

The whys and wherefores of this technological revolution have been chronicled numerous times, and their presentation is beyond the scope of this chapter. But it was an autonomous process of research, innovation, and application which developed not as a response to the crisis of industrial capitalism but as the work of a community of practice that emerged at the unlikely crossroads of military-sponsored, big science and university-based, counter-cultural networks (Castells, 2001).

The second comment is that, while the three processes were independent in their origins, they interacted extensively in their development. Thus, the culture of personal freedom that originated in the university-based social movements inhabited the minds of the innovators who designed the actual shape of the technology revolution. Thus the personal computer was contemplated in direct contradiction to the programmed trajectory of the corporate industry. And the tradition of proprietary invention was challenged, by asserting the right to diffuse, at no cost, the protocols at the source of the Internet or the software programs that constituted the bulk of applications of the new computing world. The university tradition of sharing discovery and communicating with peers was relied upon, in the hope of seeing invention improved by the collective work of the network, in sharp contrast to the world of corporations and government bureaucracies that had made secrecy and intellectual property rights the source of their power and wealth.

One had to be imbued with the ideals and values of the cultural movements of the 1960s and 1970s, oriented toward free expression, personal autonomy, and challenge to the establishment, in order to imagine the set of inventions that constituted the information technology revolution. Microsoft was, of course, the exception to the rule, and this is reflected in the animosity that still arises among the cutting-edge innovators of the information age. So, while most of the processes of technological innovation, and informationalism, originated independently of the corporate world (except for the invention of the transistor, which was, in fact, rapidly diffused into the public domain by Bell Labs), the shape and content of technology was culturally influenced by the social movements of the time. Not that the inventors were social activists (they were not, they were too busy inventing), but they breathed the same air of individual freedom and personal autonomy that was sustaining the movement, and was sustained by the movement (Levy, 2001).

On the other hand, when business engaged in its own restructuring process, it took advantage of the extraordinary range of technologies that were available from the new revolution, thus stepping up the process of technological change, and hugely expanding the range of its applications. Thus, the decision to go global in a big way, while being facilitated by government policies of deregulation, liberalization, and privatization, would not have been possible without computer networking, telecommunications, and information technology-based transportation systems. The network enterprise became the most productive and efficient form of doing business, replacing the Fordist organization of industrialism (see below). While it is true that the internal decentralization of companies and networks of firms began earlier, based on the fax, telephone, and electronic exchange systems, the full networking of companies, the digitalization of manufacturing, the networked computerization of services and office work, could only take place, from the 1980s onwards, on the basis of the new information and communication technologies.

In sum, the culture of freedom was decisive in inducing network technologies which, in turn, were the essential infrastructure for business to operate its restructuring in terms of globalization, decentralization, and networking. Only then could the knowledge-based economy function at its full potential because data, minds, bodies, and material production could be related globally and locally, in real time, in a continuous interactive network.

From the restructuring of business emerged the global, networked economy. From its success, and the simultaneous demise of statism, a new model of informational capitalism was constituted. From the opposition to its social, cultural, and political consequences emerged new forms of social movement. From the globalization and networking of both business and social movements arose the crisis of the nation-state of the industrial era. In sum, from the interaction between three originally independent processes (the crisis of industrialism, the rise of freedom-oriented social movements, and the revolution in information and communication technologies) there emerged a new form of social organization, the network society.

THE NETWORK SOCIETY: STRUCTURE, DIMENSIONS, DYNAMICS

A Global Society

Digital networks are global, as they know no boundaries in their capacity to reconfigure themselves. So, a social structure whose infrastructure is based on digital networks is by definition global. Thus, the network society is a global society. However, this does not mean that people everywhere are included in these networks. In fact, for the time being, most are not. But everybody is affected by the processes that take place in the global networks of this dominant social structure. This is because the core activities that shape and control human life in every corner of the planet are organized in these global networks: financial markets; transnational production, management, and the distribution of goods and services; highly skilled labor; science and technology; communication media, culture, art, sports; international institutions managing the global economy and intergovernmental relations; religion; the criminal economy; and the transnational NGOs that assert the rights and values of a new, global civil society (Castells, 2000a, b; Held and McGrew, 1999; Volkmer, 1999; Stiglitz, 2002; Juris, 2004).

However, the network society diffuses selectively throughout the planet, working on the pre-existing sites, organizations, and institutions that still make up most of the material environment of people's lives. The social structure is global, but most human experience is local, both in territorial and cultural

terms (Borja and Castells, 1997). Specific societies, as defined by the current boundaries of nation states, or by the cultural boundaries of their historical identities, are deeply fragmented by the double logic of inclusion and exclusion in the global networks that structure production, consumption, communication, and power. I propose the hypothesis that this fragmentation is not simply the expression of the time lag required by the gradual incorporation of territorial social forms into the new dominant logic. It is, in fact, a structural feature of the network society. This is because the reconfiguring capacity inscribed in the process of networking allows the programs governing every network to search for valuable additions everywhere and to incorporate them, while bypassing and excluding those territories, activities, and people that have little or no value for the performance of the tasks assigned to the network. Indeed, as Geoff Mulgan observed, "networks are created not just to communicate, but also to gain position, to outcommunicate" (1991: 21). The network society works on the basis of a binary logic of inclusion/exclusion, whose boundaries change over time, both with the changes in the network's programs and with the conditions of performance of these programs.

It also depends on the ability of social actors, in various contexts, to act on these programs, modifying them according to their interests. The global network society is a dynamic structure, it is highly malleable to social forces, to culture, to politics, to economic strategies. But what remains in all instances is its dominance over activities and people who are external to the networks. In this sense, the global overwhelms the local, unless the local becomes a node in alternative global networks, as is the case with the incorrectly labelled "anti-globalization movement," which is a global movement for global justice according to its participants.

Thus, the imperfect globalization of the network society is, in fact, a highly significant feature of its social structure. The coexistence of the network society, as a global structure, with industrial, rural, communal or survival societies, characterizes the reality of all countries, albeit with a different share of population and territory on both sides of the divide, depending on the relevance of each segment for the dominant logic of each network. This is to say that various networks will have different geometries and geographies of inclusion and exclusion. The map of the global criminal economy is not the same as the map of the international location of high-technology industry, although they both have points of connection: drug lords depend on computers and the Internet, and quite a few Silicon Valley engineers invent with the help of cocaine.

Thus, in theoretical terms, the network society must be analyzed, first, as a global architecture of self-reconfiguring networks constantly programmed and reprogrammed by the powers that be in each dimension; second, as the result of the interaction between the various geometries and geographies of the networks that include the core activities, that is, the activities shaping life and

work in society; and, third, as the result of a second-order interaction between these dominant networks and the geometry and geography of disconnection of social forms left outside the global networking logic.

Two theoretical comments are necessary to complete this analysis. First, structures do not live by themselves; they always express, in a contradictory and conflictive pattern, the interests, values, and projects of the actors who produce the structure while being conditioned by it. Second, inclusion/exclusion in the network society cannot be assimilated to the so-called "digital divide" as the use of the Internet and connection to telecommunication networks do not guarantee actual incorporation into the dominant networks or counter-domination networks that shape society. Yet, exclusion from the operative infrastructure of the network society is a good indicator of deeper structural subordination and irrelevance.

What is Value in the Network Society?

What constitutes value in this kind of social structure? What moves the production system? What motivates the appropriators of value and controllers of society? No change here: value is what the dominant institutions of society decide is value. So, if capitalism still dominates the world, and capital accumulation is the supreme value, then this will be value in every instance, as, under capitalism, money can ultimately buy everything else. The critical fact is that, in a social structure organized in global networks, whatever is the hierarchy between the networks will become the rule in the entire grid of networks organizing/dominating the planet. If, for instance, we say that capital accumulation is what moves the system, and the return on capital is fundamentally realized in the global financial market, the global financial market will assign value to every act in every country, as no economy is independent of financial valuation decided in the global financial markets. But if we consider that the supreme value is military power, the technological and organizational capacity of powerful military machines will structure, through their global networks of domination, their surrogate power in armed forces of different kinds, operating in every social setting. Block the transmission of technology, information, and knowledge to a particular armed organization, and it becomes irrelevant in the world context. To give another illustration: we may say that the most important influence in today's world is the transformation of people's minds. If so, then, the media are the key networks, as the media, organized in global oligopolies and their distributive networks, are the primary source of messages and images that reach people's minds.

Thus, given the variety of the potential origins of network domination, the network society is a multidimensional social structure in which networks of different kinds have different logics of value making. The definition of what

constitutes value depends on the specificity of the network, and of its program. Any attempt to reduce all value to a common standard comes up against insurmountable methodological and practical difficulties. If money making is the supreme value under capitalism, military power ultimately conditions state power and the capacity of the state to decide and enforce new rules (ask the Russian oligarchs about Putin). At the same time, state power, even in non-democratic contexts, largely depends on the beliefs of people, on their capacity to accept the rules or, alternatively, on their willingness to resist. Then, the media system and other means of communication, such as the Internet, could precede state power, which, in turn, would condition the rules of money making, and thus would supersede the value of money as supreme value. Thus, value is, in fact, an expression of power: whoever holds power (often different from who is in government) decides what is valuable.

In this sense, the network society does not innovate. What is new, however, is its global reach, along with its networked architecture. This means, on the one hand, that relations of domination between networks are critical. They are characterized by constant, flexible interaction: for instance, between global financial markets, geopolitical processes, and media strategies. On the other hand, because the logic of value making, as an expression of domination, is global, those instances that have a structural impediment to existing globally are at a disadvantage with regard to others whose logic is inherently global.

This has considerable practical importance because it is at the root of the crisis of the nation-state of the industrial era (not of the state as such because every social structure generates its own form of state). Since the nation-state can only enforce its rules in its own territory, except in the case of alliances or invasion, it has to become either imperial or networked to relate to other networks in the definition of value. This is why, for instance, the US state, in the early twenty-first century, has made a point of defining security against terrorism as the overarching value for the entire world, as a way of building a military-based network that would assure its hegemony by placing security over money making or lesser goals (such as human well-being) as the supreme value. On the other hand, capital has always enjoyed a world without boundaries, as David Harvey has repeatedly reminded us, so that global financial networks have a head start as the defining instances of value in the global network society (Harvey, 1990).

Yet human thought is probably the most rapidly growing element, under conditions of relying on global/local, chosen-time, interactive communication – which is exactly what we have nowadays, for the first time in history (Mitchell, 2003). Thus, ideas, or specific sets of ideas, could assert themselves as the truly supreme value (such as preserving our planet, our species) as a precondition for everything else.

In sum, the old question of industrial society – indeed, the cornerstone of

classical political economy – namely, "what is value?" has no definite answer in the network society. Value is what is processed in every dominant network at every moment in every space according to the hierarchy programmed into the network by the actors acting upon the network. Capitalism has not disappeared, but it is not – against ideologically inspired perception – the only source of value in the global town.

Work, Labor, and Class: The Network Enterprise and the New Social Division of Labor

This helps us understand the new division of labor, and therefore work, productivity, and exploitation. People work, they always have. In fact, people work more (in terms of total working hours in a given society) than they ever have, since most of women's work was previously not counted as socially recognized (paid) work (Guillemard, 2003). The crucial matter has always been how this work is organized and compensated. The division of labor was, and still is, a measure of what is valued and what is not in labor contribution. This judgment is organized in a particular form in the process of production, and is assigned a position in the sharing of the product, determining differential consumption and social stratification.

The most fundamental divide in the network society is what I have conceptualized, schematically, as "self-programmable labor" and "generic labor." Self-programmable labor has the autonomous capacity to focus on the goal assigned to it in the process of production, find the relevant information, recombine it into knowledge, using the available knowledge stock, and apply it in the form of tasks oriented toward the goals of the process. The more our information systems are complex, and interactively connected to databases and information sources, the more labor needs the ability to use this searching and recombining capacity. This requires appropriate training, not in terms of skills, but in terms of creative capacity, and the ability to evolve with organizations and with the addition of knowledge in society.

On the other hand, tasks that are not valued are assigned to "generic labor," eventually being replaced by machines or decentralized to low-cost production sites, depending on a dynamic cost–benefit analysis. The overwhelming mass of working people on the planet, and still the majority in advanced countries, are generic labor. They are disposable, except if they assert their right to exist as humans and citizens through their collective action. But in terms of value making (in finance, in manufacturing, in research, in sports, in military action, or in political capital) it is the self-programmable worker that counts for any organization in control of the resources. Thus, labor organization in the network society also acts on a binary logic, dividing self-programmable labor from generic labor. Furthermore, the flexibility and adaptability of both kinds of labor in a constantly changing environment is a precondition for their use as labor.

This specific division of labor is gendered to some extent. The rise of flexible labor is directly related to the feminization of the paid labor force, a fundamental trend in the social structure of the past three decades (Carnoy, 2000). The patriarchal organization of the family forces women to value the flexible organization of their professional work as the only way to cope with family and job duties. This is why more than 70 percent of temporary workers and part-time workers in most countries are women. Furthermore, while most women are employed as generic labor, their educational level has risen considerably compared with men, while their wages and working conditions have not changed at the same pace. Thus, women became the ideal workers of the networked, global economy: able to work efficiently, and adapt to the changing requirements of business, while receiving less compensation for the same work, and having fewer chances of promotion because of the ideology and practice of the gender division of labor under patriarchalism.

However, reality is, to use an old word, dialectical. While the mass incorporation of women into the paid labor force, partly because of their condition of patriarchal subordination, has been a decisive factor in the expansion of global, informational capitalism, the very transformation of women's condition as salaried women has ultimately undermined patriarchalism. The feminist ideas that emerged from the cultural social movements of the 1970s found a fertile ground in the experience of working women exposed to discrimination. But, even more importantly, the economic power won by women in the family strengthened their position vis-à-vis the male head of the family, while undermining the ideological justification of their subordination on the grounds of the respect due to the authority of the male bread-winner. Thus, the division of labor in the new organization of work is gendered, but this is a dynamic process, in which women are reversing dominant structural trends and inducing business to bring men into the same patterns of flexibility, job insecurity, downsizing, and offshoring of their jobs that used to be the lot of women. Thus, rather than women workers rising to the level of male workers, most male workers are being downgraded to the level of most women workers. This long-term trend has profound implications for both the class structure of society and the relationship between men and women at work and at home.

Autonomy and self-programmable capacity in labor would not yield its productivity pay-off if it were not able to be combined with the networking of labor. Indeed, the fundamental reason for the structural need for flexibility and autonomy is the transformation of the organization of the production process. This transformation is represented by the *rise of the network enterprise*. This new organizational business form is the historical equivalent under informationalism of the so-called Fordist organization of industrialism (both capitalist

and statist); that is, the organization characterized by high volume, standardized mass production, and vertical control of the labor process according to a top-down rationalized scheme ("scientific management" and Taylorism, the methods that prompted Lenin's admiration, leading to its imitation in the Soviet Union). Under Fordism, consumers were supposed to like all cars according to the Ford model T – and in black. And workers just had to follow the instructions of engineers to improve the efficiency of their physical movements on the assembly line, as immortalized by Charles Chaplin in *Modern Times*. Although there are still hundreds of thousands of workers in similarly run factories, the value-producing activities in the commanding heights of the production process (research and development, innovation, design, marketing, management, and high volume, customized flexible production) depend on an entirely different type of firm, and, therefore, of a different type of work process, and of labor: the network enterprise.

This is not a network of enterprises. It is a network made from either firms or segments of firms, and/or from the internal segmentation of firms. Thus, large corporations are internally decentralized as networks. Small and medium businesses are connected in networks, thus ensuring the critical mass of their contribution, while keeping their main asset: their flexibility. Small and medium business networks are often ancillary to large corporations, in most cases to several of them, except in the Japanese *keiretsu* and Korean *chaebol*. Large corporations, and their subsidiary networks, usually form networks of cooperation, called, in business parlance, strategic alliances or partnerships. But these alliances are rarely permanent cooperative structures. This is not a process of oligopolistic cartelization. These complex networks link up on specific business projects, and reconfigure their cooperation in different networks with each new project.

The usual business practice in this networked economy is one of alliances, partnerships, and collaborations that are specific to a given product, process, time, and space. These collaborations are based on sharing capital and labor, but most fundamentally information and knowledge, in order to win market share. So these are primarily information networks, which link suppliers and customers through the networked firm. The unit of the production process is not the firm but the business project, enacted by a network, the network enterprise. The firm continues to be the legal unit of capital accumulation. But since the value of the firm ultimately depends on its financial valuation in the stock market, the unit of capital accumulation, the firm, becomes itself a node in a global network of financial flows. Thus, in the network economy, the dominant layer is the global financial market, the mother of all valuations. This global financial market works only partly according to market rules. It is also shaped and moved by information turbulences of various origins, processed and communicated by the computer networks that constitute the nerve system of the global, informational, capitalist economy (Hutton and Giddens, 2000).

Financial valuation determines the dynamics of the economy in the short term. But in the long run, everything depends on productivity growth. This is why the source of productivity constitutes the cornerstone of economic growth, and therefore of profits, wages, accumulation, and investment. And the key factor for productivity growth in this knowledge-intensive, networked economy is innovation (Lucas, 1999). Innovation is the capacity to recombine factors of production in a more efficient way, and/or produce higher value added in process or in product. Chapter 6 in this volume reminds us of this basic fact. Innovation depends on innovators. And innovators, as analyzed in chapter 2, depend on cultural creativity, on institutional openness to entrepreneurialism, on labor autonomy in the labor process, and on the adequate financing of this innovation-driven economy.

The new economy of our time is certainly capitalist, but it is a new brand of capitalism. It depends on innovation as the source of productivity growth, on computer-networked global financial markets, whose criteria for valuation are influenced by information turbulences, on the networking of production and management, internally and externally, locally and globally, and on labor that is flexible and adaptable in all cases. The creators of value have to be self-programmable, and able to autonomously process information into specific knowledge. Generic workers, reduced to their role as underlings, must be ready to adapt to the needs of the firm, or else face displacement by machines or alternative labor forces.

In this system, rather than exploitation in the traditional sense, the key issue for labor is the differentiation between three categories: those who are the source of innovation and value; those who merely carry out instructions; and whose who are structurally irrelevant, either as workers (not enough education, living in areas without the proper infrastructure and institutional environment for global production) or as consumers (too poor to be part of the market). For the mass of the world population their primary concern is how to avoid irrelevance, and, instead, to engage in a meaningful relationship, such as the relationship we used to call exploitation. Because exploitation does have a meaning for the exploited. The danger is, rather, for those who become invisible to the programs commanding the global networks of production, distribution, and valuation.

Communication, Media, and the Public Space

In the realm of communication, the network society is characterized by a pattern of networking, flexibility, the recombination of codes, and ephemeral symbolic communication. This is a culture primarily organized around and

integrated by a diversified system of electronic media, including the Internet. Cultural expressions of all kinds are enclosed and shaped by this interlinked, electronic hypertext, formed by television, radio, print media, film, video, art, and Internet communication in the so-called "multimedia system" (Croteau and Hoynes, 2000).

This multimedia system, even in its current state of oligopolistic business concentration, is not characterized by one-way messages to a mass audience. This was the mass culture of the industrial society. Media in the network society present a large variety of channels of communication, with increasing interactivity. And they do not constitute the global village of a unified, Hollywood-centered culture. They are inclusive of a wide range of cultures and social groups, and send targeted messages to selected audiences or to specific moods of an audience. The media system is characterized by global business concentration, by diversification of the audience (including cultural diversification), by technological versatility and channel multiplicity, and by the growing autonomy of an audience that is equipped with the Internet and has learned the rules of the game: namely, everything that is a collective mental experience is virtual, but this virtuality is a fundamental dimension of everybody's reality.

The enclosure of communication in the space of flexible, interactive, electronic hypertext has a decisive effect on politics. Media have become the public space (Volkmer, 2003). The Habermasian vision of the constitution and democratic political institutions as the common ground of society, or the Chicago School vision (unwittingly revived by Henri Lefebvre and Richard Sennett) of the city as the public space of communication and social integration, has faded away. The commons of society are made of electronic networks, be it the media inherited from the mass media age, but deeply transformed by digitalization, or the new communication systems built in and around the Internet. This is not to say that cities disappear or that face-to-face interaction is a relic of the past. In fact, we observe the opposite trend: the more communication happens in the electronic space, the more people assert their own culture and experience in their localities (Borja, 2003).

However, local experience remains fragmented, customized, individualized. The socialization of society – the construction of a shared cultural practice that allows individuals and social groups to live together (even in a conflictive togetherness) – takes place nowadays in the networked, digitized, interactive space of communication, centered around mass media and the Internet. Thus, the relationship between citizens and politicians, between the represented and the representative, depends essentially on what happens in this media-centered communication space. Not that the media dictate politics and policies. But it is in the media space that political battles of all kinds are fought, won, and lost. Here, again, media politics works, as other instances of

the network society, in a binary mode: to be or not to be on television. Or, as chapter 16 in this volume documents, on the Internet, as an alternative form of political presence, using the input of grassroots power. Therefore, the language of politics and media tactics are essential in shaping the public mind, and therefore the capacity of societies to manage themselves. Which takes us to the fundamental question in social theory: the question of power.

Power in the Networks

Where does power lie in the network society? I have already analyzed the power of the networks that make up the network society over human communities or individuals who are *not* integrated into these networks. In this case, power operates by exclusion/inclusion. But who has power in the dominant networks? This depends on how we define power. Power is the structural capacity to impose one's will over another's will. There can be bargaining, but, in the last resort, power is exercised when, regardless of the will of someone (a person, a social group, a category of people, an organization, a country, and the like), that actor must submit to the will of the power-holder – or else be exposed to violence of different forms. Under these conditions, the question of power-holding in the networks of the network society could be either very simple or impossible to answer.

The very simple answer: each network defines its own power system depending on its programmed goals. Thus, in global capitalism, the global financial market has the last word, and the IMF is its authoritative interpreter for ordinary mortals. The word is usually spoken in the language of the United States Treasury Department and the Federal Reserve Board, with the occasional German, French, Japanese, or Oxbridge accent, depending upon times and spaces. Or else, in terms of state military power, there is just the power of the United States, or, in more analytical terms, the power of any apparatus able to harness technological innovation in the pursuit of military power, which has the material resources and know-how to invest in technology without gravely hampering its social and economic equilibrium.

On the other hand, the question could become an analytical dead-end if we try to answer one-dimensionally: the source of power as a single entity. Military power could not prevent a catastrophic financial crisis; in fact, it could provoke it under certain conditions of irrational, defensive paranoia. Alternatively, the global financial market can be seen as an automaton, out of the control of any major financial institution, because of the size, volume, and complexity of the flows of capital that circulate in its networks, and because of the dependence of its valuation criteria on unpredictable information turbulences. Political decision-making is said to be dependent on the media, and the media constitute a plural ground, however biased in ideological and political

terms. As for the capitalist class, it does have some power, but not *the* power, as it is highly dependent on both the autonomous dynamics of global markets and on the decisions of governments in terms of regulations and policies. Finally, governments themselves are linked in complex networks of imperfect global governance, indirectly submitted to their citizenry, and periodically assailed by social movements and expressions of resistance that do not recede easily in the back room of the end of history (Nye and Donahue, 2000). So, perhaps the question of power, as traditionally formulated, does not make sense in the network society. But other forms of domination and determination are critical in shaping people's lives against their will. Let me elaborate.

In a world of networks, the ability to exercise control over others depends on two basic mechanisms: the ability to program/reprogram the network(s) in terms of the goals assigned to the network; and the ability to connect different networks to ensure their cooperation by sharing common goals and increasing resources. I call the holders of the first power position the "programmers," and the holders of the second power position the "switchers." It is important to consider that these programmers and switchers are certainly social actors, but are not necessarily identified with one particular group or individual. More often than not these mechanisms operate at the interface between various social actors, defined in terms of their position in the social structure, and in the organizational framework of society. Thus, I suggest that the power-holders are networks themselves. Not abstract, unconscious networks, not automata: they are humans organized around their projects and interests. But they are not single actors (individuals, groups, classes, religious leaders, political leaders) since the exercise of power in the network society requires a complex set of joint action that goes beyond alliances to become a new form of subject, akin to what Bruno Latour (1993) brilliantly theorized as the action-network actor.

Let us examine the workings of these two mechanisms. The capacity to program the goals of the network (as well as the reprogramming capacity) is, of course, decisive because, once programmed, the network will perform efficiently and reconfigure itself in terms of structure and nodes to achieve its goals. ICT-powered, global/local networks are efficient machines; they have no values other than performing what they are ordered to do. They kill or kiss – nothing personal. How actors of different kinds achieve the programming of the network is a process specific to each network. It is not the same in global finance as it is in military power, in scientific research, in organized crime, or in professional sports. However, all these networks do have something in common: ideas, visions, projects generate the programs. These are cultural materials. In the network society, culture is by and large embedded in the processes of communication, in the electronic hypertext, with the media and the Internet at its core. So, ideas may be generated from a variety of origins, and linked to specific interests and subcultures (for example, neoclassical economics, religious fundamentalism of various kinds, the cult of individual freedom, and the like). Yet, they are processed in society through their treatment in the realm of communication. And, ultimately, they reach the constituencies of each network on the basis of the exposure of these constituencies to the processes of communication. Thus, control of, or influence on, the apparatuses of communication, the ability to create an effective process of communication and persuasion along lines that favor the projects of the would-be programmers, is the key asset in the ability to program each network. In other words, the process of communication in society, and the organizations of this process of communication (often, but not only, the media), are the key fields in which programming projects are formed, and where constituencies are built for these projects. They are the fields of power in the network society.

There is, however, a second source of power, probably more decisive, although this is a matter for research to decide. This is to be found in the controllers of the connecting points between various strategic networks: the "switchers;" for instance, the connection between political leadership networks, media networks, scientific and technology networks, and military and security networks in asserting a geopolitical strategy. Or the connection between business networks and media networks, by using, for instance, the control of regulatory institutions on behalf of the business interests. Or the relationship between religious networks and political networks to advance a religious agenda in a secular society. Or between academic networks and business networks to exchange knowledge and accreditation for resources for the learning institutions and jobs for their products (meaning graduates).

This is not the old boys' network. These are specific interface systems that are set on a relatively stable basis as a way to articulate the operating system of society beyond the formal self-presentation of institutions and organizations. However, I am not resurrecting the idea of a power elite. There is no power elite. This is a caricatural image of power in society, whose analytical value is limited to some extreme cases of personalized dictatorship, as in Pinochet's Chile. It is precisely because there is no power elite capable of keeping under its control the programming and switching operations of all important networks that more subtle, complex, and negotiated systems of power enforcement have to be established, so that the dominant networks of society have compatible goals and are able, through the switching processes enacted by actor-networks, to communicate with each other, inducing synergy and limiting contradiction. This is why it is so important that media tycoons do not become political leaders, as in the case of Berlusconi in Italy. The more the switchers are crude expressions of single-purpose domination, the more the network society suffocates the dynamism and creativity of its multiple

sources of social structuration and social change. Switchers are not persons, but they are made up of persons. They are actors, but made up of networks of actors, engaging in dynamic interfaces that are specifically operated in each particular process of connection. *Programmers and switchers* are those actors and networks of actors that, because of their position in the social structure, *exercise power in the network society*.

Power and Counter-power in the Network Society

Processes of power-making must be seen from two perspectives: on the one hand, seizing and/or enforcing power; on the other hand, resisting power, on behalf of interests, values, and projects that are excluded or under-represented in the programs of the networks. Analytically, both processes ultimately configure power structures through their interaction. But they are distinct. They do, however, operate on the same logic. This means that resistance to power is effected through the same two mechanisms that constitute power in the network society: the programs of the networks, and the switches between networks. Thus, the collective action of social movements, in their different forms, aims to introduce new instructions and new codes into the networks' programs. For instance, new instructions in the global financial networks mean that under conditions of extreme poverty debt should be condoned for some countries, as demanded, and partially obtained, by the Jubilee Movement. Another example of a new code in the global financial networks is the project of evaluating company stocks according to the company's environmental ethics in the hope that this will ultimately impact on the attitude of investors and shareholders vis-à-vis companies deemed to be bad citizens of the planet. Under these conditions, the code of economic calculation shifts from growth potential to sustainable growth potential.

More radical reprogramming comes from resistance movements aimed at altering the fundamental principle of a network – or the kernel of the program code, to maintain the parallel with software language. For instance, if God's will must prevail under all conditions (as stated by Christian fundamentalists), the institutional networks that constitute the legal and judicial systems must be reprogrammed, not to follow the political constitution, legal prescriptions, or government decisions (for example, in letting women decide about their own bodies and pregnancies), but to submit them to the interpretation of God's will by his earthly bishops. In another example, when the movement for global justice claims that trade agreements managed by the World Trade Organization should be re-written to include environmental conservation, social rights, and respect for indigenous minorities, it is acting to modify the programs under which the networks of the global economy work.

The second mechanism of resistance consists in blocking the switches of connection between networks that allow the control of those networks by the meta-program of shared values expressing structural domination. Hence, blocking control of the media by oligopolistic business by challenging the rules of the US Federal Communication Commission that allow greater concentration of ownership. Or blocking the networking between corporate business and the political system by regulating campaign finance or by enforcing the conflict of interests between being a vice-president and receiving income from your former company, which has benefited from military contracts. Or by denouncing intellectual servitude to the powers-that-be by academics using their chairs as platforms for propaganda.

More radical disruption of the switchers affects the material infrastructure of the network society: the physical and psychological attacks on air transportation, on computer networks, on information systems, and on the networks of facilities on which the livelihood of society depends in the highly complex, interdependent system that characterizes the informational world. The challenge of terrorism is precisely predicated on this capacity to target strategic material switches so that their disruption or the threat of their disruption disorganizes people's daily lives, and forces them to live in a state of emergency – thus feeding the growth of other power networks, the security networks, that extend to every domain of life. There is, indeed, a symbiotic relationship between the disruption of strategic switches by resistance actions, and the reconfiguration of power networks towards a new set of switches organized around security networks.

Resistance to power programmed in the networks also takes place through and by networks, and these are also information networks powered by information and communication technologies (Arquilla and Ronfeldt, 2001). The so-called "anti-globalization movement" is a global/local network organized and debated on the Internet, and structurally switched on with the media network. *Al-Qaeda*, and its related organizations, is a network made up of multiple nodes, with little central coordination, and also directly aimed at its switching with the media networks, through which they hope to inflict fear among the infidels and raise hope among the oppressed masses of believers (Gunaratna, 2002).

It is characteristic of the network society that both the dynamics of domination and of resistance to domination rely on network formation and network strategies of offense and defense. Indeed, this is consistent with the historical experience of previous types of society, such as the industrial society. The factory and the large, vertically organized industrial corporation were the material basis for the development of both the industrial bourgeoisie and the labor movement. Nowadays, computer networks perform the same function for global financial markets, transnational production systems, "smart" armed forces with a global reach, terrorist resistance networks, and networked social

movements struggling for a better world. All of them aim to reach their constituencies and target audiences through the decisive switch to the media networks. In the network society, power is redefined, but it does not vanish. Nor do social struggles. Domination and resistance to domination change in character according to the specific social structure from which they originate and which they modify by their action. Power rules, counter-powers fight. Networks process their contradictory programs while people try to make sense of the sources of their fears and hopes.

Space of Flows and Timeless Time

As with all historical transformations, the emergence of a new social structure is linked to the redefinition of the material foundations of our existence, space and time, as Giddens (1984), Thrift (1986), Adams (1990), Harvey (1990), Lash and Urry (1994), and Graham and Marvin (2000), among others, have argued. Two emergent social forms of time and space characterize the network society, while coexisting with prior forms. They are the space of flows and timeless time. Space and time are related, in nature as in society. In social theory, space can be defined as the material support of time-sharing social practices. The development of communication technologies can be understood as the gradual decoupling of contiguity and time-sharing. The space of flows refers to the technological and organizational possibility of practicing simultaneity (or chosen time in time-sharing) without contiguity. Most dominant functions in the network society (financial markets, transnational production networks, media networks, networked forms of global governance, global social movements) are organized around the space of flows.

However, the space of flows is not placeless. It is made of nodes and networks; that is, of places connected by electronically powered communication networks through which flows of information circulate and interact, which ensure the time-sharing of practices processed in such a space. While in the space of places, based on contiguity of practice, meaning, function, and locality are closely interrelated; in the space of flows, places receive their meaning and function from their nodal role in the specific networks to which they belong. Thus, the space of flows is not the same for financial activities or for science, for media networks or for political power networks. Space cannot be conceived as separate from social practices. Therefore, every dimension of the network society that we have analyzed in this chapter has a spatial manifestation. Because practices are networked, so is their space. Since networked practices are based on information flows processed between various sites by communication technologies, the space of the network society is made up of the articulation between three elements: the places where activities (and people enacting them) are located, the material communication networks linking these

activities, and the content and geometry of the flows of information that perform the activities in terms of function and meaning. This is the space of flows.

Time, in social terms, used to be defined as the sequencing of practices. Biological time, characteristic of most of human existence (and still the lot of most people in the world) is defined by the sequence programmed in the life cycles of nature. Biological time was shaped throughout history by what I call bureaucratic time; that is, the organization of time, in institutions and in everyday life, by the codes of military-ideological apparatuses, working on the rhythms of biological time. In the industrial age, clock time gradually emerged; that is, the measure and organization of sequencing with enough precision to assign tasks and order to every moment of life, starting with standardized industrial work and the calculation of the time horizon of financial transactions, two fundamental components of industrial capitalism that could not work without clock time. In the network society, the emphasis on sequencing is reversed. The relationship to time is defined by the use of information and communication technologies in a relentless effort to annihilate time by negating sequencing. This is done, on the one hand, by compressing time (as in split-second global financial transactions or the effort to fight "instant wars"), and, on the other, by blurring the sequence of social practices, including past, present, and future, in a random order, as in the electronic hypertext, or in the blurring of life-cycle patterns, both in work and in parenting.

In industrial society, organized around the idea of progress and the development of productive forces, *becoming* structured *being*, time conformed to space. In the network society, the space of flows dissolves time by disordering the sequence of events and making them simultaneous, thus installing society in structural ephemerality: *being* cancels *becoming*.

The construction of space and time is socially differentiated. The multiple space of places, fragmented and disconnected, displays diverse temporalities, from the most traditional domination of biological rhythms to the control of clock time. Selected functions and individuals transcend time, while devalued activities and subordinate people endure life as time goes by. There are, however, alternative projects of structuration of time and space, as an expression of social movements that aim at modifying the dominant programs of the network society. Thus, instead of accepting timeless time as the time of automata, the environmental movement proposes to live time in a *longue durée* cosmological perspective, seeing our lives as part of the evolution of our species, and feeling solidarity with future generations, and with our cosmological belonging. This is what Lash and Urry (1994) conceptualized as glacial time.

Communities around the world also fight to preserve the meaning of locality, and to assert the space of places, based on experience, over the logic of the

space of flows, based on instrumentality, in the process that I label as the "grassrooting" of the space of flows. Indeed, the space of flows does not disappear, since it is the spatial form of the network society, but its logic can be transformed. Instead of enclosing meaning and function in the programs of the networks, it could provide material support for the global connection of local experience.

Space and time are redefined at the same time by the emergence of a new social structure and by the struggles over the shape and programs of this social structure. In a sense, space and time express the culture(s) of the network society.

Culture in the Network Society

All societies are cultural constructs, if we understand culture as the set of values and beliefs that inform and motivate people's behavior. So, if there is a specific network society, we should be able to identify the culture of the network society as its historical marker. Here again, however, the complexity and novelty of the network society suggest caution. First of all, because the network society is global, it works with and integrates a multiplicity of cultures, linked to the history and geography of each area of the world. In fact, industrialism, and the culture of the industrial society, did not make cultures disappear around the world. The industrial society had many different, and indeed contradictory, manifestations (from the United States to the Soviet Union, and from Japan to the United Kingdom). There were also industrialized cores in otherwise largely rural and traditional societies. Not even capitalism unified its realm of historical existence culturally. Yes, the market ruled in every capitalist country, but under such specific rules, and with such a variety of cultural forms, that identifying a culture as capitalist is of little analytical help, unless we actually mean by that American or Western culture: it then becomes empirically wrong.

So, in the same way, the network society develops in a multiplicity of cultural settings, produced by the differential history of each context. It materializes in specific forms, leading to the formation of highly diverse institutional systems, as the studies presented in this volume demonstrate. There is still a common core to the network society, as there was to industrial society, but there is an additional layer of unity in the network society. It exists globally in real time. It is global in its structure. Thus, not only does it deploy its logic in the whole world, but it keeps its networked organization at the global level at the same time as it makes itself specific in every society.

This double movement of commonality and singularity has two main consequences at the cultural level. On the one hand, specific cultural identities become the trenches of autonomy, and sometimes of resistance, for collectives and individuals who refuse to fade away in the logic of dominant networks. To be French becomes, again, as relevant as to be a citizen. To be Catalan, or Irish, or Basque, or Quebecois, or Kurd, or Tibetan, or Aymara, becomes a rallying point of self-identification vis-à-vis the domination of imposed nation-states. In contrast to the ideologies of the end of history, which propose the merger of all cultures in the cosmopolitan melting pot of the citizens of the world, resistance identities have exploded in the early stages of the development of the global network society, and have produced the most dramatic social and political conflicts in recent times.

Respectable theorists and less respectable ideologists may warn of the dangers of such a development. But we cannot ignore it. Observation must inform theory, not the other way around. Thus, what characterizes the global network society is the contraposition of the logic of the global Net and the affirmation of a multiplicity of local selves, as I tried to argue and document in my trilogy on the information age (Castells, 2000a, c, 2004). Rather than the rise of a homogeneous global culture, what we observe as the main common trend is historical cultural diversity: fragmentation rather than convergence. The key question that then arises is whether these specific cultural identities (made with the materials inherited from singular histories and reworked in the new context) have the capacity to communicate with each other (Touraine, 1997). Otherwise, the sharing of a social structure, while not being able to speak a common language of values and beliefs, leads to systemic misunderstanding, at the roots of destructive violence against the other. Thus, protocols of communication between different cultures are the cornerstone of the network society, as, without them, there is no society, just dominant networks and resisting communes.

The Habermasian–Beckian project of a cosmopolitan culture to create a constitution for the citizens of the world, laying the foundations for democratic global governance, identifies correctly the central cultural-institutional issue of the network society (Habermas, 1998; Beck, 2003). Unfortunately, this vision proposes the solution without being able to identify the process by which these protocols of communication could be created, given the fact that the cosmopolitan culture, according to empirical research, is present only in a very small part of the population, including in Europe (Norris, 2000). There is, indeed, no real European identity in the minds of most Europeans.

To determine, even hypothetically, what these protocols of communication are, or could be, requires an empirical analysis that, although possible, exceeds the limits of this theoretical text. But, in terms of the theory, this is my proposition: *the culture of the global network society is a culture of protocols of communication enabling communication between different cultures on the basis, not necessarily of shared values, but of sharing the value of communication*. This is to say: the new culture is not made of content but of process. It

is a culture of communication for the sake of communication. It is an open-ended network of cultural meanings that can not only coexist, but also interact and modify each other on the basis of this exchange.

I will illustrate the meaning of this admittedly abstract statement by reinterpreting one of the most original hypotheses that have been proposed to identify the culture of the information age: the "hacker ethic," in the terms conceptualized by Pekka Himanen in his influential book (Himanen, 2001), and summarized by him in chapter 19 of this volume. The hacker ethic (as exemplified in the networks of innovators that created the Internet, its applications, and much of the essential technologies of the information age) can be understood in two versions, both correct, and complementary in my view. The first, which has received broad acceptance in intellectual and business circles alike, refers to the culture of innovation for the sake of innovation. The passion to create replaces capital accumulation as a means of salvation. Playing is producing. Instead of the deferred gratification pattern of the Protestant (and capitalist) ethic, there is affirmation of an instant gratification pattern: the joy of creating and the immediate use of the creation.

But there is a second, fundamental dimension in the practice of hackers and in the theory of Himanen that has been overlooked: sharing. The free sharing of knowledge and discovery is the essential mechanism by which innovation takes place in the information age (and probably in earlier societies). And since innovation is the source of productivity, wealth and power, there is a direct relationship between the power of sharing and the sharing of power. So, networking for the sake of networking, being ready to learn from others and to give them what you have, could be the culture of the network society: a belief in the power of the network, in your empowerment by being open to others, and in the joy of diversity. In the example of hacker networks, networking is practiced on the basis of one common value: the value of creativity, the feeling of self-realization by the exercise of the capacity of the mind to challenge and invent.

So, this is my hypothesis: the culture of the network society is a culture of protocols of communication between all cultures in the world, developed on the basis of a common belief in the power of networking and of the synergy obtained by giving to others and receiving from others. A process of material construction of the culture of the network society is underway. But it is not the diffusion of the capitalist mind through the power exercised in the global networks by the dominant elites inherited from industrial society. Nor is it the idealistic proposals of philosophers dreaming of a world of abstract, cosmopolitan citizens. It is the process by which conscious social actors of multiple origins bring to others their resources and beliefs, expecting in return to receive the same, and even more: sharing a diverse world, and thus ending the ancestral fear of the other.

CONCLUSION: THE PRACTICAL CONSEQUENCES OF THEORETICAL MISTAKES

At this point in the analysis presented here, this conclusion will not come as a shock: we are not in the information or knowledge society. At least, no more than we have been in other historical periods. Knowledge and information have always been essential sources of productivity and power. If, by emphasizing the knowledge component of our world, we imply that we know now and were ignorant in earlier times, a little modesty would be welcome. Knowledge is always historically relative. We certainly know more than a few centuries ago, and we can even say that the growth of knowledge has been exponential, although in many fields of science, without these earlier discoveries, we would still be in the dark. But we certainly know very little in some basic dimensions of nature or human life. I will just mention the brain, which is the source of who we are, and whose structure and functions are ignored for the most part. As for society and the economy, I will simply remind the reader that the analysis of the aggregate production function underlying productivity growth as a result of factors others than capital, labor, or raw materials was originally established by Robert Solow in 1957, on the basis of statistical data concerning the United States for the period 1909–49, the heyday of the industrial society (Solow, 1957). Never mind: information society apologists invariably start with Solow's analysis of productivity to found their claims on the role of information as the basis of the new society.

As I have analyzed in various works, and in this volume, information and knowledge are indeed essential, in the economy and in society at large. But they are not specific as dominant components of our kind of society. What is specific is that, on the basis of a new technological paradigm (informationalism), a new social structure has emerged, a structure made up of electronic communication technologies – powered, social networks. So, what is different? It is the technology, of course. But it is also the networked social structure, and the specific set of relationships implied in the networking logic.

Therefore, in my view, we must let the notion of an information society or of a knowledge society wither, and replace it with the concept of the network society, as presented in this chapter, and researched throughout this volume, from a variety of theoretical perspectives. I contend that this reconceptualization matters because it carries practical consequences.

If we were now in an information society, as a direct consequence of the invention and diffusion of electronic information and communication technologies, the economic and social development of a country would depend, for instance, on installing computers everywhere, and pushing everybody to be on the Internet or not to be. Studies on the uses of information and communication technologies demonstrate, again, what historians of technology established

long since) that technology can only yield its promise in the framework of cultural, organizational, and institutional transformations. Computers in school are only as good as the teachers are. And teachers cannot do much unless the organizational set-up of the school transcends the disciplinary bureaucracies of the information age. Or, alternatively, the Internet in universities cannot do much in the context of a cultural and academic setting that, in many cases, has changed little since the pre-industrial theological schools.

Furthermore, computers and the Internet do little to help economic productivity and business competitiveness in the absence of the diffusion of the organizational form represented by the network enterprise. The dot-com bust was provoked by the fantasies of business consultants and futurologists who forgot that the key role of the Internet is to power the real economy, rather than to escape into the domain of a new, virtual economy. And electronic democracy must start with the redefinition of citizen participation and political participation.

In broader terms of social evolution, the notion of the information society reproduces the myth of the historical continuum from nomadic to agricultural societies, then to industrial society, to culminate in the apogee, obviously in our time, of the information society. Human history is then assimilated to the long march of progress under the guidance of reason (with occasional prayers to God just in case), as exemplified by the wonders of computers, clean toilets, and smart weapons. No conflict, no contradiction, just technologically predetermined change, and resistance to change. And since resistance to reason is irrational, it must be obliterated to clear the shining path toward our promised star.

If, instead, we identify our society as a network society, in the precise sense defined and elaborated in this chapter, we must place at the center of the analysis the networking capacity of institutions, organizations, and social actors, both locally and globally. Connectivity and access to networks become essential. The right combination of information and communication technology, development of human capacity to take advantage of the full potential of these technologies, and organizational restructuring based on networking becomes the key to ensuring productivity, competitiveness, innovation, creativity, and, ultimately, power and power sharing. If we conceive of the global network society as something other than telecommunication networks, if we recall the interactive, multinodal logic of the Internet, then it is possible to design communication systems for inclusion and collaboration. If all cultures have their relevance as nodes of a networked system of cultural dialogue, there is no opposition between hypermodernity and tradition, but complementarity and reciprocal learning.

In sum, the notion of the information or knowledge society is simply a technological extrapolation of the industrial society, usually assimilated to the Western culture of modernization. The concept of the network society shifts the emphasis to organizational transformation, and to the emergence of a globally interdependent social structure, with its processes of domination and counter-domination. It also helps us to define the terms of the fundamental dilemma of our world: the dominance of the programs of a global network of power without social control or, alternatively, the emergence of a network of interacting cultures, unified by a common belief in the use value of sharing.

REFERENCES

Adam, Barbara (1990) *Time and Social Theory*. Cambridge: Polity Press.

Arquilla, John and Ronfeldt, David (eds) (2001) *Networks and Netwars: The Future of Terror, Crime, and Militancy*, Santa Monica, CA: RAND Corporation.

Beck, Ulrich (2003) "Las instituciones de gobernanza mundial en la sociedad global de riesgo," in Manuel Castells and Narcis Serra (eds), *Guerra y paz en el siglo XXI*, pp. 53–66. Barcelona: Tusquets.

Berners-Lee, Tim, with Frischetti, Mark (1999) *Waving the Web*. San Francisco: HarperCollins.

Borja, Jordi (2003) *La ciudad conquistada*. Madrid: Alianza.

—— and Castells, Manuel (1997) *Local and Global*. London: Earthscan.

Capra, Fritjof (1996) *The Web of Life*. New York: Random House.

—— (2002) *Hidden Connections: Integrating the Biological, Cognitive, and Social Dimensions of Life into a Science of Sustainability*. New York: Random House.

Carnoy, Martin (2000) *Sustaining the New Economy: Work, Family and Community in the Information Age*. Cambridge, MA: Harvard University Press.

—— and Castells, Manuel (1984) "After the Crisis?," *World Policy Journal* (Fall).

Castells, Manuel (1980) *The Economic Crisis and American Society*. Princeton, NJ: Princeton University Press.

—— (2000a) *End of Millennium*, 2nd edn. Oxford: Blackwell.

—— (2000b) "Materials for an Exploratory Theory of the Network Society," *British Journal of Sociology* 51: 1 (January–March), 5–24.

—— (2000c) *The Rise of the Network Society*, 2nd edn. Oxford: Blackwell.

—— (2001) *The Internet Galaxy*. Oxford: Oxford University Press.

—— (2004) *The Power of Identity*, 2nd edn. Oxford: Blackwell.

—— and Kiselyova, Emma (2003) *The Collapse of the Soviet Union: The View from the Information Society*. Los Angeles: Figueroa Press/USC Bookstore.

Colas, Dominique (1992) *La Glaive et le fleau: généalogie du fanatisme et de la société civile*. Paris: Bernard Grasset.

Croteau, David and Hoynes, William (2000) *Media/Society: Industries, Images, and Audiences*, 2nd edn. Thousand Oaks, CA: Pine Forge.

David, Paul (1975) *Technical Choice, Innovation and Economic Growth: Essays on American and British Experience in the Nineteenth Century*. London: Cambridge University Press.

Fischer, Claude (1992) *America Calling: A Social History of the Telephone to 1940*. Berkeley, CA: University of California Press.

Freeman Christopher (1982) *The Economics of Industrial Innovation*. London: Frances Pinter.

Giddens, Anthony (1984) *The Constitution of Society: Outline of a Theory of Structuration*. Cambridge: Polity Press.
Gould, Stephen J. (1980) *The Panda's Thumb: More Reflections on Natural History*. New York: W. W. Norton.
Graham, Stephen and Marvin, Simon (2000) *Splintering Networks, Fragmenting Cities: Urban Infrastructure in Global Local Age*. London: Routledge.
Guillemard, Anne-Marie (2003) *L'Age de l'emploi*. Paris: Armand Colin.
Gunaratna, Rohan (2002) *Inside Al Qaeda: Global Network of Terror*. New York: Columbia University Press.
Habermas, Jurgen (1998) *Die Postnationale Konstellation*. Frankfurt: Suhrkamp.
Harvey, David (1990) *The Condition of Postmodernity*. Oxford: Blackwell.
Held, David and McGrew, Anthony (1999) *Global Transformations*. Stanford, CA: Stanford University Press.
Himanen, Pekka (2001) *The Hacker Ethic and the Spirit of the Information Age*. New York: Random House.
Hutton, Will and Giddens, Anthony (eds) (2000) *On the Edge: Living in Global Capitalism*. London: Jonathan Cape.
Johnson, Steve (2001) *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*. New York: Scribner.
Juris, Jeff (2004) "Transnational Activism and the Cultural Logic of Networking," unpublished PhD thesis in anthropology, University of California, Berkeley, California.
Kuhn, Thomas (1962) *The Structure of Scientific Revolutions*. Chicago, IL: University of Chicago Press.
La Bianca, Oystein (ed.) (forthcoming) *Connectivity in Antiquity*.
Lash, Scott and Urry, John (1994) *Economies of Signs and Space*. London: Sage.
Latour, Bruno (1993) *We Have Never Been Modern*. Cambridge, MA: Harvard University Press.
Levy, Steve (2001) *Hackers: Heroes of the Computer Revolution*, 2nd edn. New York: Penguin.
Lucas, Henry (1999) *Information Technology and the Productivity Paradox*. New York: Oxford University Press.
Mazlish, Bruce (1993) *The Fourth Discontinuity: The Co-evolution of Men and Machines*. New Haven, CT: Yale University Press.
Mitchell, William J. (2003) *ME ++: The Cyborg Self and the Networked City*. Cambridge, MA: MIT Press.
Mokyr, Joel (1990) *The Lever of Riches: Technological Creativity and Economic Progress*. Oxford: Oxford University Press.
Monge, Peter R. and Contractor, Noshir S. (2003) *Theories of Communication Networks*. Oxford: Oxford University Press.
Mulgan, Geoff J. (1991) *Communication and Control: Networks and the New Economies of communication*. New York: Guilford Press.
Norris, Pippa (2000) "Global Governance and Cosmopolitan Citizens," in Joseph Nye and John Donahue (eds), *Governance in a Globalizing World*, pp. 155–77. Washington, DC: Brookings Institution Press.
Nye, Joseph and Donahue, John (eds) (2000) *Governance in a Globalizing World*. Washington, DC: Brookings Institution Press.
Perez, Carlota (1983) "Structural Change and the Assimilation of New Technologies in the Economic and Social Systems," *Futures* 15: 357–75.
Solow, Robert M. (1957) "Technical Change and the Aggregate Production Function," *Revue of Economics and Statistics* 39 (August): 214–31.